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A COMPARISON OF THE IMMUNITY PRODUCED IN CATTLE BY THE INOCULATION OF *BR. ABORTUS* STRAIN 19 INTRADERMALLY, INTRACAUDALLY AND SUBCUTANEOUSLY

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Previous experiments carried out in this country have shown that S.19 *Br. abortus* vaccine is a reliable and effective antigen for immunising cattle against contagious abortion (Edwards, McDiarmid, de Ropp & McLeod (1946), McDiarmid (1949 a and b) and Taylor & McDiarmid (1949)). As the demand for this vaccine will increase and in view of the difficulties of production, it is essential to investigate any method of administration that might diminish the dose required without impairing its antigenic power.

Campbell and Rodwell (1945) reported that the intradermal injection of 0·2 ml. of S.19 vaccine produced high agglutination titres in cattle similar to those obtained by 25 times this dose given subcutaneously, and that still higher titres followed the intracaudal injection of 1 ml. They deduced from these experiments that high titres indicated a satisfactory degree of immunity, but this supposition was not confirmed by exposure of the cattle to a known experimental infection. To confirm the work of Campbell and Rodwell, McDiarmid (1948) carried out a preliminary experiment in guinea-pigs and found that an intradermal dose of 0·04 ml. of S.19 vaccine produced as good an immunity as 25 times this dose given subcutaneously. The present paper concerns similar experimental work in cattle and it will be shown that small doses either intradermally or intracaudally produce a high degree of immunity.

MATERIALS AND METHODS

Animals.—These consisted of 42 Ayrshire heifers 15 to 18 months of age reared in a *Br. abortus* free herd at this field station and negative to the agglutination test on two occasions prior to the commencement of the experiment. They were divided into four groups and housed in isolation units.

Vaccination.—S.19 *Br. abortus* vaccine, as issued from the Ministry of Agriculture's Veterinary Laboratory at Weybridge, was inoculated as follows:—

(1) Subcutaneous group (ten heifers).—A dose of 5·0 ml. was injected under the skin in the chest wall just behind the olecranon process. After vaccination the area was massaged.

(2) Intradermal group (ten heifers).—The same area was chosen and 0·2 ml. was injected by the technique ordinarily employed for tuberculin testing.

(3) Intracaudal group (ten heifers).—1·0 ml. was inoculated into the fibrous tissue under the skin about half an inch from the tip of the tail.

(4) The remaining 12 animals constituted the non-vaccinated control group.

Local effect of vaccination

(1) Subcutaneous group.—When the animals were examined one week after vaccination the usual large oedematous swellings were present. They measured up to 10 inches in diameter in some instances, and were sensitive to touch, but no lameness was noticed. Two weeks after vaccination the large swellings had subsided and only a slight hardening of the underlying tissues could be palpated.

(2) Intradermal group.—One week after vaccination the majority of the animals showed a reaction area about three centimetres in diameter with a small necrotic spot in the centre. The necrotic area had commenced to slough in some animals, but no sensitivity was noticed. Fourteen days after vaccination all the animals showed only slight scabs at the inoculation sites.

(3) Intracaudal group.—One week after vaccination, apart from some cylindrical swelling involving the whole of the tip of the tail, no abnormality was noticed; the tails did not appear to be unduly sensitive and seven days later the tails appeared normal.

Mating.—Two bulls were used and mating was commenced at the first oestrus after vaccination; with two exceptions all the heifers proved to be in calf prior to the application of the infective dose.

Exposure to virulent infection.—When the majority of heifers were about five months in calf approximately 150 million virulent *Br. abortus* organisms, Strain 544, were instilled into the conjunctival sac of each animal. The virulence of the suspension of organisms was confirmed in guinea-pigs as shown in Table I.

TABLE I

VIRULENCE TEST OF INFECTIVE DOSE

Ten guinea-pigs inoculated with 3×10^6 Strain 544

Sixteen days			Nine weeks		
Agglutination titre	Spleen wt. per body-weight ratio	Approx. No. of *Br. abortus* in spleen	Agglutination titre	Spleen wt. per body weight ratio	Approx. No. of *Br. abortus* in spleen
320	0·14	358,000	81,920	0·43	1,200
2,560	0·30	183,000	2,560	0·24	1,500
640	0·13	397,000	163,840	0·54	5,400
1,280	0·22	378,000	2,560	0·41	1,400
1,280	0·25	333,000	Guinea-pig died—not examined		

Agglutination tests.—Blood samples from all the heifers were examined at monthly intervals throughout the course of the experiment by the technique of Stableforth (1936). Additional tests were made immediately after vaccination and infection.

Examination of materials collected after parturition.—In addition to agglutination tests, cotyledons, colostrum, foetal stomach contents and milk samples were examined culturally and biologically for the presence of *Br. abortus*

by methods similar to those employed by Edwards *et al.* The examination of milk from each heifer was carried out once each week for ten weeks after parturition.

Results

Table II shows in detail the collected data relating to each experimental animal. Table III (page 364) consists of a summary of the principal findings and shows the incidence of *Br. abortus* in the milk after parturition, and Fig. 1 (page 364) depicts the mean agglutination titres for each of the four groups throughout the course of the experiment.

Non-vaccinated control group.—The infective dose in this experiment appeared to be adequate since all 12 animals in this group became infected and ten calves were born dead. One animal, namely, J 97, appeared to have a very slight degree of infection since *Br. abortus* was detected only in the colostrum, and there by biological examination only. Numerous milk samples from this group were shown to be infected.

Subcutaneous group.—The results corresponded to those obtained in previous experiments with this particular dose; only one out of a total of eight animals became infected and six living calves were born. No infection was detected in the milk from these heifers.

Intradermal group.—In this group the immunity produced was of a high order. Nine animals were protected out of ten and nine living calves obtained. The mean titres, as shown in Fig. 1, were similar throughout the course of the experiment to those obtained in the group inoculated subcutaneously. No milk samples were infected.

Intracaudal group.—The protection rate was similar to the previous group, two animals out of ten developing in-

Table

Comparison of Immunity Produced by Various Doses

	Heifer No.	Agglutination titres of serum: Weeks prior to vaccination		Weeks after vaccination I. Dose																	
		1	0	1	2	3	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64
5 ml. S.C.	J 70	—	—	7	13	13	12	8	6	6	6	5	6	6	5	6	6	6	6	6	6	6
	J 75	—	—	7	10	9	7	4	3	2	3	3	3	3	3	3	6	2	2	2	2	2
	J 92	—	—	7	9	8	8	6	5	4	4	4	4	4	4	6	5	5	5	4	4	3
	J 96	—	—	5	9	9	7	6	5	4	4	...	...	...	...	...	...	...	...	...	...	NP
	J118	—	—	6	11	10	10	7	6	5	5	4	5	6	5	5	7	6	6	5	6	6
	J171	—	1	8	13	14	12	9	6	6	5	...	...	...	...	...	...	...	...	...	...	NP
	J184	—	—	6	10	10	8	5	5	4	4	3	4	4	5	6	2	4	4	4	4	5
	J185	—	—	7	9	9	9	5	4	3	3	3	5	3	3	3	2	2	2	2	2	2
	643	—	—	5	9	9	6	5	5	3	3	4	5	4	4	3	Died					
	K15	—	—	8	8	8	6	5	4	3	2	2	3	3	3	1	3	2	2	2	2	1
1 ml. I.C.	J 21	—	—	6	10	10	11	8	6	6	5	5	5	5	5	5	5	Died				
	J 72	—	1	8	12	12	10	7	5	5	4	4	5	4	4	3	4	3	3	4	4	4
	J119	—	—	10	13	12	13	8	7	7	7	6	7	8	9	15	9	10	10	10	½	11
	J127	—	1	11	14	15	11	7	6	6	6	6	7	8	4	8	7	5	5	6	6	6
	J139	—	1	9	10	10	7	6	5	6	5	5	5	4	5	5	4	4	4	5	5	4
	J140	—	—	6	9	9	9	6	6	5	5	4	5	5	4	4	6	5	5	5	5	5
	J155	—	—	8	13	12	9	7	6	4	4	4	6	6	4	7	6	6	6	5	6	6
	J187	—	—	10	12	11	9	7	5	6	6	5	6	5	5	5	6	6	6	5	5	4
	662	—	—	7	12	12	10	9	8	6	7	7	7	9	8	10	8	6	Dead			
	670	—	—	9	12	12	10	6	5	5	4	4	5	4	4	4	5	5	5	4	5	4
0·2 ml. I.D.	J 66	—	—	4	13	10	9	7	5	5	5	4	4	5	4	4	5	5	5	5	5	4
	J123	—	—	7	10	9	8	7	5	5	5	5	5	4	4	5	5	5	5	5	5	4
	J128	—	1	5	8	8	7	4	5	4	4	4	7	4	5	9	5	4	4	4	4	5
	J147	—	—	5	10	9	6	5	4	3	3	3	2	3	3	4	4	3	3	3	3	3
	J160	—	—	6	12	11	9	6	6	5	4	4	4	6	5	4	5	5	5	5	5	3
	J169	—	—	3	10	11	7	6	5	5	4	3	4	4	3	3	4	3	3	3	3	4
	J172	—	—	5	9	8	7	6	5	3	3	3	4	3	3	3	3	3	Dead			
	J177	—	—	7	11	10	8	6	5	5	5	5	5	6	5	5	7	6	6	5	5	4
	J188	—	—	4	9	9	6	5	4	3	3	3	4	4	3	3	3	3	3	4	4	3
	K 6	—	—	4	10	9	7	6	5	4	4	5	5	4	4	3	4	4	4	4	4	2
Control group	J 71	—	—	1	—	1	2	1	1	—	—	—	5	6	9	8	7	6	6	6	6	6
	J 85	—	—	—	—	1	—	—	—	—	—	—	3	3	8	13	9	8	8	9	9	12
	J 97	—	—	—	—	—	—	—	—	—	—	—	3	1	1	—	5	6	6	6	6	8
	J166	—	—	—	—	—	—	—	—	—	—	—	4	4	9	8	6	5	5	4	2	3
	J173	—	—	—	—	1	1	—	—	—	—	—	8	9	7	6	6	5	5	5	5	7
	J178	—	—	—	—	1	—	—	—	—	1	—	5	7	4	5	6	8	8	7	6	9
	J186	—	—	1	—	1	—	—	1	—	—	—	5	5	7	8	7	7	6	5	5	4
	J189	—	—	—	—	—	1	—	—	—	—	—	4	6	7	7	6	6	6	5	4	4
	K 2	—	—	—	—	1	1	1	1	—	—	—	5	8	6	6	6	6	6	6	6	6
	K 7	—	—	1	—	—	—	—	—	—	—	—	7	9	8	6	5	4	4	4	4	4
	K 8	—	—	—	—	1	—	—	—	—	—	—	6	7	6	5	6	5	5	4	4	3
	K17	—	—	—	1	1	2	1	1	1	—	—	6	6	5	2	2	2	2	2	2	2

The agglutination titres are expressed as tube numbers except at parturition.

I. dose signifies Infective dose applied
NP ,, Non-pregnant
D ,, Dead
+ ,, Positive

S.C. signifies subcutaneously
... ,, Not done
TA. ,, Typical abortion
N. ,, Negative

fection. The most interesting feature was the high titre reached in the majority of animals after vaccination as shown in Fig. 1. One milk sample was found to contain a CO_2 sensitive strain of *Br. abortus*.

Discussion

This experiment achieved the practical object of showing that smaller doses than those hitherto employed for the routine subcutaneous injection could confer an effective immunity if injected intradermally or intracaudally. Certain advantages are associated with the immunisation of cattle by 0·2 ml. intradermally. The quantity of vaccine required is diminished considerably, thereby reducing the cost of production and lessening the technical difficulties associated with the production of large quantities of viable antigen. The technique of inoculation is simplified, especially for those accustomed to routine tuberculin testing. The local reaction is slight and severe systemic disturbances are eliminated; this, we believe, might be of value in the inoculation of lactating animals with a view to avoiding a decrease in the milk yield; it has already been shown that 5·0 ml. subcutaneously has an immediate depressing effect on the secretion of milk, the loss averaging 24 lb. (Holman & McDiarmid (1945)). The intracaudal method also has the undoubted advantage of ease of administration, especially so in the case of dairy cows limited in their movements by the yoke system of tying.

Owing to the limited capacity of the isolation units it was not possible to compare the effect of the intradermal or intracaudal method against decreasing doses given subcutaneously. It could, therefore, be argued that a smaller

II

OF S.19 VACCINE ADMINISTERED BY DIFFERENT ROUTES

History of pregnancy						Tests at parturition					
						Cotyledons		Foetal stomach		Colostrum	
Service to infection (days)	Infection to parturition (days)	Duration of pregnancy (days)	Parturition	Fate of calf	Blood serum titre	Cult.	Biol.	Cult.	Biol.	Cult.	Biol.
141	143	284	Nl.	L.	320	N.	N 0/5	...	...	N.	N 0/5
158	120	278	Nl.	L.	40	N.	N 0/5	...	...	N.	N 0/5
143	144	287	Nl.	L.	160	N.	N 0/5	...	...	N.	N 0/5
148	140	288	Nl.	L.	320	N.	N 0/5	...	...	N.	N 0/5
110	109	219	TA.	D.	320	+	+ 5/5	+	+ 5/5	N.	N 0/5
154	129	283	Nl.	L.	20	N.	N 0/5	...	...	N.	N 0/5
146	134	280	Dystokia	D.	160	N.	N 0/5	...	...	N.	N 0/5
145	135	280	Nl.	L.	40	N.	N 0/5	...	...	N.	N 0/5
114	166	280	Dystokia	D.	160	N.	N 0/3	N	N 0/5	N.	N 0/4
149	129	278	Nl.	L.	160	N.	N 0/5	...	...	N.	N 0/5
129	104	233	P.	K.	163,840	+	+ 5/5	N.	N 0/5	N.	+ 5/5
156	131	287	Nl.	L.	1,280	N.	N 0/5	...	...	N.	N 0/5
152	127	279	Nl.	L.	160	N.	N 0/5	...	...	N.	N 0/5
83	198	281	Nl.	L.	320	N.	N 0/5	...	...	N.	N 0/5
153	100	253	P.	D.	640	+	+ 5/5	N.	N 0/5	N.	N 0/5
160	121	281	Nl.	L.	160	N.	N 0/5	...	...	N.	N 0/5
148	126	274	Nl.	L.	1,280	N.	N 0/5	...	...	N.	N 0/5
98	180	278	Nl.	L.	160	N.	N 0/5	...	...	N.	N 0/5
151	131	282	Nl.	L.	160	N.	N 0/5	...	...	N.	N 0/5
153	131	284	Nl.	L.	160	N.	N 0/5	...	...	N.	N 0/5
134	107	241	TA.	D.	320	+	+ 5/5	+	+ 4/5	N.	N 0/5
136	150	286	Nl.	L.	80	N.	N 0/5	...	...	N.	N 0/5
134	148	282	Nl.	L.	80	N.	N 0/5	...	...	N.	N 0/5
128	159	287	Nl.	L.	80	N.	N 0/5	...	...	N.	N 0/5
130	152	282	Nl.	L.	40	N.	N 0/3	...	...	N.	N 0/5
145	136	281	Nl.	L.	160	N.	N 0/5	...	...	N.	N 0/5
157	130	287	Nl.	L.	40	N.	N 0/5	...	...	N.	N 0/5
145	142	287	Nl.	L.	80	N.	N 0/5	...	...	N.	N 0/5
151	60	211	TA.	D.	320	+	+ 3/3	+	+ 3/3	N.	N 0/2
153	99	252	P.	L.	5,120	+	+ 3/3	...	...	+	+ 3/3
158	123	281	Nl.	L.	40	N.	N 0/5	...	...	N.	+ 5/5
145	78	223	TA.	D.	640	+	+ 3/3	+	+ 2/2	N.	N 0/3
160	70	230	TA.	D.	2,560	+	+ 3/3	N.	+ 1/2	N.	+ 3/3
118	45	163	TA.	D.	640	+	+ 3/3	+	+ 3/3	N.	+ 1/3
137	71	208	TA.	D.	1,280	+	+ 3/3	N.	+ 2/2	N.	+ 2/3
?	61		TA.	D.	1,280	+	+ 2/2	N.	N 0/3	N.	+ 2/2
147	56	203	TA.	D.	1,280	+	+ 3/3	+	+ 2/2	N.	+ 1/3
144	47	191	TA.	D.	2,560	+	+ 3/3	+	+ 3/3	N.	+ 1/3
81	48	129	TA.	D.	320	+	+ 3/3	+	+ 3/3	N.	N 0/3
145	28	173	TA.	D.	320	+	+ 3/3	+	+ 3/3	N.	+ 1/3

I.C. signifies Intracaudally
Nl. „ Normal
P. „ Premature
N 0/5 „ Five guinea-pigs negative

I.D. signifies Intradermally
L. „ Living
K. „ Killed by cow

Fig. 1

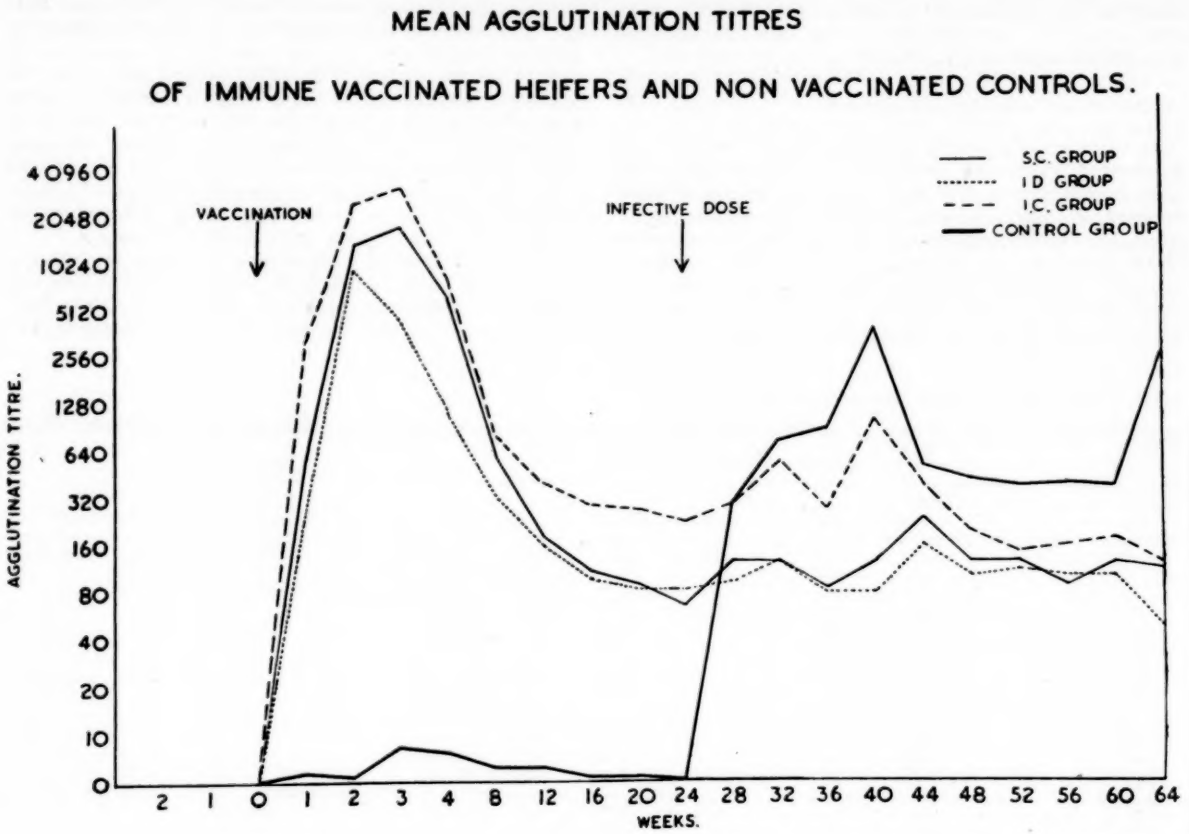

Table III

Summary of Results

Protection by S.19 vaccine against 150 million Strain 544 *Br. abortus*

Route of injection	Subcutaneous	Intradermal	Intracaudal	Controls
Dose of vaccine	5·0 ml.	0·2 ml.	1·0 ml.	0
Heifers in groups	10	10	10	12
Number pregnant at time of test dose	8	10	10	12
Test dose of 150 million *Br. abortus* Strain 544 ...	+	+	+	+
Number of live calves ...	6	9	7	2
Number of cows infected ...	1	1	2	12
Milk samples examined culturally for *Br. abortus* ...	70	100	88	120
Number of samples positive	0	0	0	3*
Milk samples tested biologically	70	100	88	118
Number of samples positive	0	0	1	24†

* Signifies from three different cows.
† Signifies from ten different cows.

dose given by the subcutaneous route would have been as effective as the routine 5·0 ml. dose, and further work is in progress to determine the equivalent values of the antigen given by these different methods.

All these facts must be considered when assessing the relative merits of the methods under discussion. We may, however, tentatively suggest that, should the demand for vaccine become so great as to embarrass the source of supply, the intracaudal or preferably the intradermal route of administration might be considered as a possible alternative.

Conclusion

The intradermal inoculation of 0·2 ml. or the intracaudal inoculation of 1·0 ml. S.19 *Br. abortus* vaccine confers an immunity in heifers comparable to that produced by the subcutaneous inoculation of 5·0 ml. of the same antigen.

Acknowledgment.—I wish to express my thanks to Dr. W. S. Gordon, director of this field station, for his continued interest and advice and to Mr. S. J. Edwards for applying the infective dose. The work was carried out under the general supervision of the Agricultural Research Council's Committee on Brucellosis.

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BONE AND JOINT INJURIES IN THE DOG *

BY

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This subject is, I am sure, of immediate interest to the majority of you. The town practitioner meets many such cases following motor accidents, and frequently they are very severe injuries owing to the relative size of the patient and the vehicle. A point of interest is the greater incidence of hind limb damage compared with fore limb and head. It may be that in the panic of finding himself trapped, the dog manages to extricate his fore end but cannot deal also with the hind quarters. Again, the explanation may lie in the differing anatomy of the extremities. The fore leg is relatively mobile. Its trunk attachments are completely muscular, the shoulder joint lacking in restrictive ligaments, so that the limb can be twisted quite severely without suffering damage and spring back to its normal position when released. In contrast, the hind leg has a rigid attachment to the trunk through the hip joint and pelvis. The other joints of this limb permit little rotatory or lateral motion to absorb twist or torque or extreme range of movement, and if this violence is applied to the leg, dislocation of the hip or fracture of the femur or tibia is suffered. For these reasons my paper will be confined almost wholly to consideration of injuries of the hind limb, and the higher parts of it.

The traumatic dislocation of the coxo-femoral joint is the commonest dislocation with which we have to deal, in contrast to man in which such traumatic injury is not common. The relative violence suffered in accidents is, of course, the reason. In the preponderance of cases the displacement is upwards, due to the pull of the gluteals and other powerful muscles passing from the pelvis to the femur. The very odd and unusual case is seen occasionally when the femoral head is driven downwards and becomes impacted into the obturator foramen. There is a characteristic position of the limb in this displacement; the leg is abducted and outwardly rotated in a grotesque manner and, due to the position of the head of the femur, the limb is longer than its fellow. When passive movement is attempted it is seen to be very restricted in all directions. This is a rare displacement, depending solely upon the direction of the mechanical forces during the accident. Apart from this, all cases are upwards, and indeed the obturator impaction is very simply changed to the common upward position.

We have experimented on a number of cadavers to dislocate the hip by a variety of forces, but only in one direction can displacement be accomplished and that is by extreme and continued abduction—far beyond the normal range of movement. Probably this is the common course of events in street accidents, the wheel passing over the groin while the dog is on its back or over the hip region when spread-eagled on the ground. The movement, struggling and muscular spasm following this, displace the femoral head above the acetabulum. The distance of displacement is greater than the diameter of the acetabulum and in the normal-sized dog will be about 1 inch. To permit this, there must be complete rupture of all the retaining structures—round ligament, capsular ligament and some associated muscles.

In experimental cases of dislocation by extreme abduction—over the edge of a table—the upper rim of the femoral neck makes contact with the edge of the acetabulum, and from this time the movement is one of leverage of the head from the socket with this point as fulcrum. The head commences to lift, the ventral capsular ligament is first stretched, and then ruptures and the head projects through the tear. The line of rupture of the capsule is quite constant at what is apparently the weakest point, its attachment to the rim of the femoral head. The round ligament then comes under stress as the abduction continues and commences to strip and lengthen until but a few strands remain. The head is now free except for the dorsal capsular ligament. With rotation of the femur to twist the head forward and an upward thrust, the characteristic position is gained and the last tatters of the capsular ligament are torn. It will be seen that usually the head is completely stripped of its attachments, which retain their acetabular union. The round ligament apparently may rupture at any point in its length—cases do occur in which the ligament resists rupture and the point of separation is the femoral head itself, a fragment of bone being detached. The complete ligament and the bone fragment fall into the acetabulum. This, of course, partially blocks the cavity. In addition, the almost complete cuff of the capsular ligament prolapses into the socket, adding a further block. Haemorrhage in the region, particularly when organised, would appear to complete, within a week or so, the obstruction to full reduction of the dislocation.

So far as I am aware, there is no recognised " drill " for reduction of the hip, such as is used in human cases. There it appears the capsular ligament is not usually so grossly injured as in our cases. There is a strip tear in the capsule, forming a buttonhole wound through which the head is projected. The progressive steps of the reduction technique are designed to return the head along the same path by which it left the socket. In the dog, with almost complete destruction of the capsule, reduction may be along any path without adding further to the damage. I will describe the method of reduction used here and I shall be pleased to have information from you as to any particular method used.

Good anaesthesia is imperative. Nembutal or pentothal is the choice, although morphine narcosis followed by epidural anaesthesia is very satisfactory. Having obtained good muscular relaxation, the patient is controlled so that the manipulative movements can be performed. We prefer to have an assistant clasping the animal with a forearm in the groin, but loops of rope or towelling through the groin and fastened to the table may be used. With the position of the femoral head visualised in relation to the acetabulum, powerful traction is applied in a downward and forward direction either in snatching jerks or a continuous pull. The relationship between the head and the socket must be known, otherwise the head is dragged round the rim of the socket—indeed, this very often happens when we have what we consider to be good direction. Possibly this is due to muscular spasm so restricting the freedom of the head that it is not permitted to climb the rim of the socket. If this method fails after several attempts, due to faulty direction, muscular spasm or lack of weight or strength on the part of the operator, the method is changed.

The hip is slowly and gently abducted to the full extent, and then flexed and extended in a similar manner. This is intended to break down adhesions, overcome muscle spasm and probably ruptures some muscle fibres. The femoral

* Presented to the Society of Women Veterinary Surgeons, March 8th, 1950.

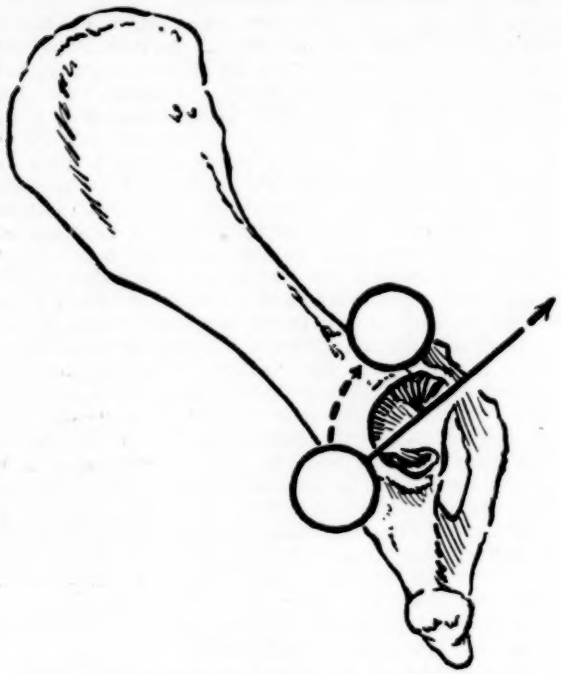

Fig. 1: Showing the direction of traction, and the deviation frequently followed by the femoral head.

head may be displaced from its original position during this manipulation, but this is immaterial. With the tissues around the part relaxed the oblique traction is reapplied. Although the head will follow the traction, it may not enter the socket, and failing to negotiate the anterior rim pass around the acetabulum. It will then gain the iliac position, which can be ascertained by rectal examination or deep palpation into the inguinal region. In a thin dog the outline of the head may be seen. If the head persists in this slide round the rim of the socket, I change the mode of entrance and try to pass via the acetabular notch on its lower edge, closed by the cotyloid ligament. When the head is displaced from its upward and forward position it always travels to a forward and downward position—never posterior. To rotate the head into the acetabulum from below, the leg is rotated from the abducted position. The rotation is pivoted on the tip of the trochanter, which is supported in position by the thumb, and also by tension on the tendons of the gluteal muscles.

I have never heard and felt that click or crunch of complete reduction such as is heard when a dislocated elbow is replaced. Success is based upon the ease of movement in every direction, particularly in full flexion of the hip. In a joint which still is not reduced there is a distinct resistance to full flexion. This is due to the maldirected extensors of the hip—middle gluteus, semimembranosus, semitendinosus. In addition, there should be comparison of the two limbs. Are the hind legs of equal length? Are the two trochanters of equal prominence? Does radiography confirm the reduction?

In all cases of successfully reduced dislocation of the hip it is disconcertingly simple, by a slight lift of the femur, to redislocate. I consider all reduced hips to be unstable, with incomplete entry of the femoral head into the socket, due to the block previously mentioned—capsule and round

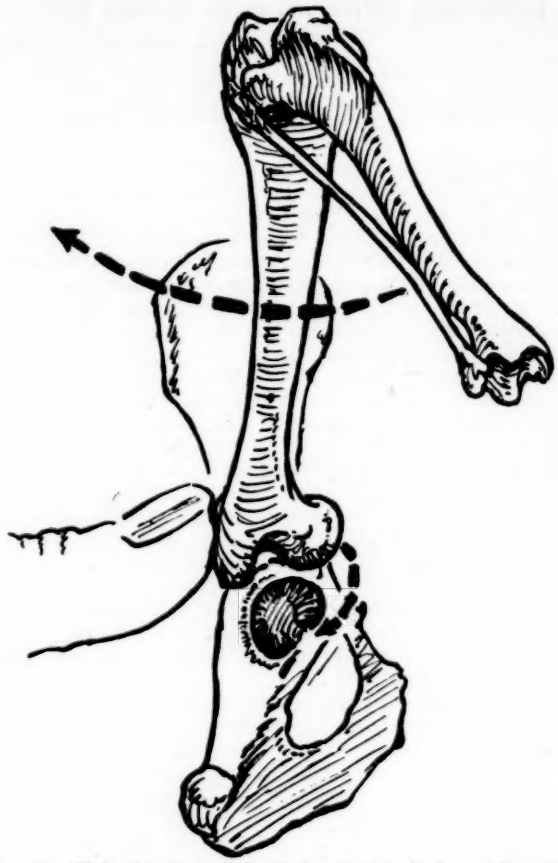

Fig. 2: With the femoral head in the inguinal position, the trochanter is supported by the thumb and the leg rotated outwards to enter the head from the ventral approach to the acetabulum.

ligament. Attempts to overcome this block are made by pressure on the trochanter, by flexion and extension, abduction and rotation for a few minutes. This may squeeze out the prolapsed capsule. With such unstable reduction, redislocation is possible—and indeed probable during the inco-ordinate movement associated with recovery from the anaesthetic. With this recurrence in view it is our practice to restrain such movement by strapping the injured limb to the trunk until recovery from the anaesthetic is complete—overnight usually. The careful movement of the painful limb when the patient is conscious will reduce the risk of redislocation. Not infrequently, when relieved from the elastoplast strapping next day, the dog will lower the limb and use it tentatively.

We know that dislocation of the hip is suffered almost solely by the mature animal, whose bones are fully developed and having no weak epiphyseal lines at the extremities. In the immature dog the common injury in the hip region is separation of the epiphyseal head of the femur, simulating very closely the clinical appearance of dislocation of the hip. A similar violence has been applied to the region—extreme abduction—but the round ligament proves sturdier than the epiphyseal cartilage, and it is the latter that ruptures, leaving the femoral head in the socket. Variations of this are seen, from a tearing off of the small plate of bone into which the round ligament is inserted, to fracture through the true neck of the femur—

well lateral to the epiphyseal line. These are truly crippling injuries, and the joint is an absolute derelict. Treatment of this epiphyseal fracture has made no improvement. The difficulty of manipulation, fixation, and immobilisation of the minute fragment to the mass of the main bone in our ambulatory patients seems at the moment to be insurmountable. Much fibrous tissue and irregular distribution of new bone is laid down about the joint. Small adventitious new joints are formed at points of bony apposition. Movement of the limb therefore is extremely restricted, although many dogs manage to get about quite well for the requirements of a pet animal.

It is to be expected that the violence leading to dislocation of the hip and fracture of the epiphyseal head—extreme abduction—may stop short of the complete injury, but, nevertheless, damages the soft structures to such an extent as to leave a traumatic arthritis or injure the epiphyseal cartilage so that development of the young femoral head is arrested. Closely associated with such injury is the disease we know as Perthe's disease, an avascular necrosis of the femoral head due to interference with the blood supply to the extremity following slipping of the epiphyseal cartilage. This is thought to have hereditary characteristics, particularly in fox-terriers, and to be made manifest by some stress, great or little. Clinically, the disease simulates separation of the femoral head, but is slow in onset in contrast to the sudden appearance in the fracture. Lameness is at first slight, the leg being carried occasionally. Later the lameness becomes continuous, and pain is shown on abduction and other extreme movements. There is some shortening of the leg, but it is slight compared to that produced by fracture or dislocation. It is difficult to account for this shortening. It may be caused by resistance to extension during examination, but is more probably due to the slight slip of the femoral head and to lack of development at this point.

It is remarkable, considering the gross injuries suffered in dislocation of the hip, that use of the limb in so many cases becomes so good. It is considered that the replaced head, by pressure and movement within the socket, leads to the production of an adventitious synovial bursa which replaces to some extent the perfect synovial capsule and capsular ligament of the normal joint. The round ligament never recovers its continuity. There remains a second-rate joint which functions quite well, but later may be the site of an arthritis.

Injuries of the femoro-tibial articulation (stifle joint) are rarely gross in character. Traumatic dislocation and fracture are very rare. Nevertheless, injuries of apparently slight degree can cause discomfort and pain to the animal. Dislocation of the patella is the most frequent abnormality, but others occur of which we know little. Injuries to the semilunar cartilages give a vague picture; the lameness is sudden in onset; there is no local evidence of the site of injury, but there is distinct pain on provoked overextension of the joint. Radiographic evidence cannot be gained. Although there may be tears of these cartilages and trapping of the tags between the femur and tibia on movement, it may also be due to sprain of any part of the ligamentous apparatus. Operation on these cases has been successfully carried out by Fritz Nilsson, of the Royal Veterinary College, Stockholm, and reported in *The North American Veterinarian* for August, 1949.

Rupture of the crucial ligaments gives a characteristic picture. Lameness arrives suddenly. There is no pain on manipulation of the joint and remarkably little evidence of it in extreme movement, flexion, extension or rotation. There is occasionally to be noted, however, a characteristic, heavy thud during these movements, due to increased range of antero-posterior movement of the tibia on the femoral condyles. The thud is due to the condyles slipping off the semilunar cartilages. The increased mobility and the crepitation can be shown by grasping the femur in one hand and the tibia in the other, close to the joint: extend, and then move the two articular surfaces in opposite directions from front to rear. I do not know of anything useful that can be done, beyond advising rest.

Dislocation of the patella receives spasmodic attention, and a variety of operations have been devised to replace and retain the patella on the trochlea. Rarely, however, do we see or hear of these operations being used with consistent success. All such cases, excepting the very rare ones due to direct trauma, are caused by a fault in skeletal development and if this is uncorrected, no matter how the soft tissues are manipulated for adjustment, recurrence will take place. There may be a deficiency in height of the trochleal ridges—they may be completely absent, and will not retain the patella however nicely refitted. Combined with this fault there will probably be lack of alignment between the origin of the crural muscles, the trochlea and the tibial crest. If this alignment is correct, the patella lying between well-developed ridges, displacement cannot occur. If there is slight misalignment it can be further exaggerated, and displacement take place, by extending the stifle and rotating the tibia inward. This carries with it the prominent tibial crest followed by the patella ligament and then the patella. This will be a temporary displacement and correction will take place when the tibial crest returns to its central position. You have all encountered this when holding a struggling peke; the suggestive snap of displacement is heard when this position is assumed in the turmoil.

The treatment of fractures in the small animals has never been very satisfactory, and to me, and I am sure to all of you, a case of fracture of the femoral shaft has meant profound dissatisfaction. It is the most frequently injured bone and the most difficult to which to apply the recognised principles of setting a fracture—reduction, coaptation, immobilisation, with external splintage. Ours are immediately ambulatory patients, and quite intolerant of any method of restraint of themselves or their individual limbs. There is little recognition of this fact by the public, so that we are driven, willy-nilly, to do something active; something obvious. We copy the treatment of the human surgeon—blessed with subjects whose limbs are elongated cylinders, admirable for the application of external splints and plaster casts; blessed with patients who are quite willing to lie abed and be cared for, for a few weeks, and who can suffer restriction upon their movements with patience. Weight of public opinion, or fear of such opinion, has for many years forced us to copy and teach this picture of external splintage and committed us to a fraudulent copy.

The dog's thigh, shaped as an inverted cone, particularly in the short-legged, heavily muscled breeds, such as the Sealyham, is an impossible structure upon which to build a plaster cast and hope to control the deeply embedded bone. Only half (at the most) of the thigh can be, I will not say controlled, but even enclosed in plaster owing to the combined anatomy of the thigh and trunk. By this means I think we might claim to immobilise perhaps the hock and the lower two-thirds of the tibia. Reduction and coaptation of fractured femora is never seriously undertaken, for it is known that displacement is imme-

diate. With these casts movement at the fracture point is certain, and the weight of the cast will certainly increase the pendulum swing of the leg. The Thomas type extension splint, with the extension pressure applied to the groin, suffers similar disabilities. A certain degree of extension can be expected, but the point of movement is the pressure point and, as this is mid-way up the femur, mid-shaft and higher fractures are not controlled at all. The remarkable thing is that so many do so well, and if continuous movement be a factor in the breakdown of pre-osseous tissue, that more fibrous unions and " flail " legs do not occur.

In the past few years there have been developed what would appear to be the ideal methods of dealing with these difficult fractures in our restless patients. I refer to those methods of bone control by metallic appliances applied direct to the bone—external shaft pinning, intramedullary pinning, plating, and wiring. External shaft pinning—Stader or Kirschner-Ehmer type appliance—is good, but some factors are present which will discourage its general use. There is the obvious one of the present impossibility of buying these splints. There is also the matter of the expense of these sets, and the number and sizes required if much fracture work is to be done. The projection of the apparatus from the limb and the possibility of consequent accidents is to be kept in mind, although in our small experience this has not occurred. Continual watch is necessary for loosening of the screws and pins. It is necessary to have the dog hospitalised for the whole period of healing. In comparison with the intolerance shown to external plaster-cast splinting, these external bone pins are completely ignored by the patient. This, I think, is accounted for by the complete freedom of movement of the limb allowed by the pinning method and by the fact that the dog can carry it in the position most comfortable to himself. In applying a hind limb plaster splint for tibial or femoral fractures it is part of the technique to extend the joints to the full and fix in this position. On recovery from the anaesthetic the dog attempts to carry the helpless leg in the semi-flexed position so comfortable and so natural. Of course, a pressure rub is commenced and so irritates the skin that he insists on worrying and biting at the splint.

The intramedullary splinting of fractures appears very promising, and it is fortunate that the bones least amenable to external splinting—femur, tibia and humerus—are well suited anatomically to this technique.

With a pin driven down the medulla of a bone all the requirements of the classical principles of fracture treatment are observed to a far greater degree than with external splinting. Reduction—end-to-end application—is certain and remains so. Immobilisation is almost perfect. Coaptation is good but varies. Some slight lateral and rotational play is permitted on the cylindrical pins we use. If boring through the extremities is necessary for their insertion, then we must use this type of pin and overcome the rotation by other means.

There are two methods of introducing the pins. The " blind " method is that in which the pin is passed through the bone extremity without opening at the fracture site. I think this should be done if possible, but the patient is the limiting factor. In the cat, with its lightly muscled legs, and provided there is not a great deal of oedema, the outline of the bone can be distinguished easily and blind pinning commenced with some confidence, although preparation should always be made in readiness for the open operation. Having recognised the two fragments, the pin is driven through the skin and on to the bone.

In the case of the femur the aiming point is just medial to the tip of the great trochanter. The pin traverses the superficial, middle and deep gluteus muscles and passes in to the depth of the trochanteric fossa. In this position the pin is ¼ inch in front of the sciatic nerve and just lateral to the coxo-femoral joint capsule.

In the tibia the pin is entered just medial to the patellar ligament on the table of the crest and mid-way between the tip of the crest and the joint capsule.

For the humerus the bony ridge of the lateral tuberosity is palpated and the pin is inserted just medial to the ridge at its most prominent point. This passes close to and may traverse the edge of the joint capsule.

Having engaged the pin at these points, and taken aim at the lower extremity of the fragment, rotation will pass the point through the cortex into the medullary cavity, when the increased ease of passage will be noticed. Pressure is continued, and in the slim leg which we are considering the point of the pin will be felt to emerge from the fracture site. The pin is slightly withdrawn under cover of the bone, the limb extended, the lower fragment brought into apposition and the pin passed into the remainder of the bone—threaded on to the pin.

This method is possible in some dogs, but if the limbs are short or heavily muscled it is impossible to detect the fragments with accuracy, so that direction is faulty and it is possible for the pin to enter the bone and emerge again through the cortex. Again, it has happened that the upper fragment has been penetrated successfully and then it has been found impossible to insert the pin into the lower fragment. Open operation is then undertaken to complete the splinting. In some cases it will be seen, on opening the fracture site, that the interference to reduction and pin insertion into the lower fragment is the presence of muscular tissue between the fractured ends. It is not uncommon, particularly when the fragments are widely displaced, to find the fractured ends buried in the neighbouring muscle masses. Extension traction will not displace the bones from such a position and it is necessary to " unbutton " these penetrations with the finger during extension.

A particular problem is the displaced lower epiphysis of the femur. It is a common fracture and as with injury of the upper epiphysis—the femoral head—it results in complete crippling of the leg. The small fragment prolapses behind the shaft, the lower end of which then projects into the femoro-patellar joint region, completely ruining joint function. We have found great difficulty in reducing and immobilising this type of injury. Powerful extension combined with leverage upon the fragment is necessary and even by such means accurate reapplication of the fragment is not usual. Leverage by means of a bone skid not infrequently causes some splintering of the soft epiphyseal bone.

The internal splinting of fractures is a great forward step and great credit must be given to the pioneers of our profession, who have adapted the technique to our animals. It must be admitted, too, that without the help of penicillin and the sulphonamides the difficulties probably would have been insurmountable. What place will this method of fracture treatment take in practice? Obviously the economic factor will restrict such treatment to the more valuable animals, while the majority of dogs will receive the quite adequate rest treatment or external splintage. A slight shortening of a leg is of little moment to the pet animal. Before ending I will remind you of the utility—and harmlessness—of the old-fashioned " charge " applied to the hair of the upper thigh.

Discussion

Miss Yates, in opening the discussion, expressed her appreciation of the paper, finding it very comforting in confirming the desirability of "masterly inactivity" in many cases of fracture of the pelvis and femur, in spite of the client's demand for spectacular plasters. She stressed the amazing faculty of the town dog in avoiding street accidents. She too found hip dislocations difficult to reduce; many dogs went through life with chronic hind leg lameness, but apparently little discomfort. She frequently got old dislocations which were not attended at the time of accident, and found it impossible in many cases to reduce these. She agreed that dislocation of the shoulder was uncommon and could remember only one case in her practice—a Yorkshire terrier which fell downstairs. This was easily reduced and did not recur. An injury frequently met with and one on which she would like Mr. Shuttleworth's views, was fracture of the pelvis. This seemed generally to result from the dog being pushed from the rear, and the most common fractures were the pubic symphysis or a crack across the ischium. She found in these cases the owner appreciated the fact that plasters were inadvisable and cases generally did well, except in the case of the breeding bitch. Intramedullary pinning was theoretically ideal in fractures of the femur and humerus, but was often impracticable in general practice when the average single-handed practitioner had not time to carry it out. She appreciated the efforts of those who were specialising in these methods and considered it advisable to make use of their experience. She had had a lot of trouble from stifle injuries with intermittent lameness and asked Mr. Shuttleworth if he had any ideas on the arthritic stifle in short-legged dogs, especially the Scottie, which generally appeared in the middle-aged or elderly dog, and after an initial stage of pain seemed to settle down to a chronic limp for the rest of its life.

Mr. Shuttleworth replied that he considered Miss Yates had covered most of the ground with regard to fractures of the pelvis when she said she did nothing. Some Americans applied the Stader splint, but with slight fractures, the split pubis, ilium, etc., there was almost invariably good healing following rest. Severely collapsed or crushed pelvises could, however, show a life-long lameness and tendency towards constipation. He demonstrated a five-month kitten suffering from osteodystrophia, where the bones were soft, but with no evidence of rickets. The collapse of the pelvis shown in the X-ray photograph of this animal had been due to the slight weight of the body upon the femora and the pelvis was a twisted S-shaped tube producing severe constipation. With regard to arthritic stifles he had very little to say, except that rheumatism and previous injuries were both possible causes and the use of salicylates advisable.

Miss Brancker agreed heartily with the policy of inactivity rather than the use of plasters for injuries of the pelvis and femur. She asked what suggestions Mr. Shuttleworth had for the treatment of the medium type of patella luxation, where the grooves were present but the patella slipped out. This condition was common in certain types of ponies and she had found that walking exercise was helpful—was this likely to be useful in the case of dogs? She cited one case of fracture of the femur in a very powerful bull terrier where the bone was left unsplinted, and 48 hours later the leg was reported by another veterinary surgeon to be grossly distorted with the two halves of the femur at right angles to each other.

Mr. Shuttleworth: The latter case cited by Miss Brancker was fortunately very rare. There was frequently shortening of the leg, but lateral displacement was very unusual as the normal carriage of the leg predisposed to healing in the correct alignment. The dislocated patella in the normal dog had been treated by various operative techniques—tucks in the capsular ligament, and osteotomy by taking out a wedge-shaped piece. Temporary displacement where the patella was climbing over the capsule was best treated with strapping and rest, but he contended that there must be some bony malformation before dislocation could take place. He preferred rest to walking exercise.

Miss Woods mentioned the case of a cat brought in with a fracture of the mid-shaft of the femur which apparently made a normal displaced mend. Six months later she was called in to look at the cat and found an enormous mass of juicy, cancellated, bony tissue the size of a child's head, and running the entire length of the femur. The cat was, of course, destroyed. She had had a case of a greyhound which jumped from a stationary lorry over a wall from which the ground fell away steeply. When found in the darkness the dog had managed to struggle to the other side of the field and was brought in with fractures of the lower extremities of both humeri and dislocation of the elbows as well.

Mr. Shuttleworth: In the case of the cat, it appeared to have been an osteosarcoma—the coincidence was unusual. When there was fracture of the elbow it was generally the condyles which were split off. It was unusual to have both affected, though he had known cases in heavy dogs where the additional weight from such a crippled limb had caused a similar fracture of the sound limb.

Miss Milnes: She had found that the only successful cases of reduction of the hip were those seen within 12 hours of the occurrence. In her experience reduction at this time was fairly simple—in fact, one exuberant bull terrier coming home in her car for attention had suspended itself over the back seat and that had been all that was necessary for successful reduction. Did Mr. Shuttleworth consider there was any time limit after which reduction was not worth trying? She had met similar cases to the kitten demonstrated. One was a series of spaniel puppies, all related, where the bones could be cut with a knife. She had sent these to the laboratory and the report had been an osteodystrophic condition of unknown origin. There was no evidence of rickets. She had also met it in a related series of King Charles spaniels and wondered whether the condition was hereditary. She had had a case of tuberculosis of the hip which had developed in a similar way to Perthe's disease. Did Mr. Shuttleworth know of any distinguishing feature in X-ray diagnosis of these two conditions? The first X-ray had shown no destruction of the joint, but the animal was dead lame. Three weeks later a further X-ray revealed considerable destruction of the bones of the hip; the animal was destroyed and at *post-mortem* examination caseous nodules were found in the fat surrounding the joint.

Mr. Shuttleworth had had no experience of tuberculosis of the hip. With regard to hereditary *osteogenesis imperfecta*, he had met a litter of Alsatians showing the condition in varying degrees. He considered that there was a lethal and sub-lethal stage, as some puppies were born dead but others could recover. This compared with the condition in humans where children could recover about the age of 15, but there was a lethal form where babies were born dead. He had successfully reduced a dislocated hip after three weeks, but besides the collapse of the capsular ligament into the cavity there were also the organised blood clots to contend with. If the parts could be kept in position for 24 hours the prognosis was hopeful.

Miss Freak read correspondence from Miss Joshua, who was unable to be present, concerning a five-month peke puppy said to have been lame for two weeks when examined, but which most probably had been slightly lame for a much longer period. On examination the puppy tended to keep the right hind leg drawn forward, giving the appearance of lateral curvature of the spine. On moving, the leg was kept partially fixed in an advanced position with the stifle rotated inwards. There was distinct muscle atrophy, little pain, but slight shortening on extension of the leg, probably due to muscle spasm or contraction. Apart from the great trochanter being more prominent owing to muscle atrophy, there was no difference between the tuber ischii and the great trochanter on both sides. There was no tendency for the hip to sub-luxate at this stage. A tentative diagnosis of the early stage of *coxa plana* was given and the radiograph showed some separation of the epiphyseal head and slight flattening of the articular surface. The prognosis given was that the condition would worsen for six to 12 weeks, then it might make a partial natural recovery by about ten to 12 months or might become bilateral. A month later the dog showed the same degree of lameness, the muscle atrophy was increasing, and there was a tendency for the hip to sub-luxate on flexion and extension. The treatment carried out was relative rest and attention to diet. Manganese had been suggested by Mr. C. G. Knight.

Miss Mills asked if Mr. Shuttleworth could help in the differential diagnosis of diseases of the stifle joint, especially where there was little deformity. She also described the case of a two-year-old cat which broke a fore leg; this responded to treatment, but when the cat went home it jumped off a wall and broke both femurs. There was no previous history of bone injuries and she wondered if this could be due to some dysfunction of the parathyroids.

Mr. Shuttleworth: Inco-ordinated movements and muscular contractions could produce amazing injuries, and he thought some cases of repeated fractures were just coincidence. Temporary displacement of the patella would cause a temporary arthritis due to stretching of the capsular ligament. It was possible to press the patella over the internal ridge, especially if there was internal rotation of the tibial crest. In rupture of the crucial ligaments there was a characteristic "thud" on movement of the parts. Injury to the semilunar cartilages showed a sudden onset of pain and later a considerable amount of fibrous tissue was laid down giving a bulgy appearance to the inner face of the joint and continuous pain and lameness.

Miss Milnes asked if there was any content of seaweed concerned with bone development. She knew a breeder of Siamese kittens

who had one litter all of which fractured their limbs most easily. The only difference in diet was that this litter had been fed on seaweed preparations and when this was stopped the next litter of that cat was quite normal. Was wiring of the bones efficient? She felt this might meet the need of the ordinary practitioner.

Mr. Shuttleworth replied that wiring was only of use in very oblique fractures where there would be overrunning of the pins. In the normal way if the area was having to be opened up for wiring it was better to use pins wherever possible. He had not heard of any content of seaweed being responsible, but the Pathology Department was finding that *osteogenesis imperfecta* was more common than was generally supposed.

Miss Freak produced an X-ray photograph of a six-month miniature poodle showing separation of the tibial crest. This dog had shown slight lameness for three to four weeks, carrying the leg at a trot, but showing no pain on flexion and extension. There was slight pain on pressure over the fracture. After rest in elastoplast for a fortnight there was great improvement and it now walked and trotted completely sound, although the fractured fragment was considerably displaced.

Mr. Shuttleworth said that separation of the tibial crest was seen occasionally in the young dog and that there was always displacement owing to the pull of the patella ligament. It could be screwed to the parent bone.

Miss Brancker related the case of a Great Dane pup which she had seen when three months old, when she warned the owners of the possibility of rickets. Three days later she was called in as the pup appeared to be in the early stages of rickets; from then on, however, it gradually lost the use of its legs and eventually was unable to stand, although at five and a half months it was well-developed muscularly and there was apparently no abnormality of bone.

Mr. Shuttleworth thought that the inability to stand might be due to pain. The ache of the bones was sufficient to keep the animal off its feet or there might have been spinal involvement. He had seen in a five-and-a-half-month Alsatian with *osteogenesis imperfecta*, rocking movements and inco-ordination of limbs, the animal finally sinking down. On X-ray examination the typical razor edge to the cortex of the bones was apparent.

VETERINARY COUNCIL OF IRELAND

At a recent meeting of the Veterinary Council Mr. J. A. Flynn, M.R.C.V.S., Returning Officer, reported that the ballot held in accordance with the provisions of the Veterinary Surgeons Act, 1931, revealed that the following members had been elected to hold office on the Council for four years from May 28th, 1950, *viz.*, Mr. Patk. A. Rogan, M.R.C.V.S., D.V.S.M., General Elected Member, and Mr. Martin J. Byrne, M.R.C.V.S., Limited Elected Member.

The following members were appointed to the Standing and Penal Cases and Finance Committees: The President (Mr. J. A. Flynn), Hon. Treasurer (Mr. M. J. Byrne) and Mr. P. F. Dolan.

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COMMONWEALTH AGRICULTURAL BUREAUX CONFERENCE

On Wednesday last Mr. Tom Williams, the Minister of Agriculture, opened a conference of the Commonwealth Agricultural Bureaux which is being held at Church House, Westminster, to review the work of the services provided by the bureaux since 1946. These services consist mainly in supplying information to scientists and research workers in agricultural sciences and forestry throughout the Commonwealth and, increasingly, in other countries.

The 55 delegates and observers conferred in London until today (Saturday). They will now tour the institutes and bureaux in two parties until July 6th, and reassemble for a further conference in London from July 7th to 15th.

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Weekly Wisdom

". . . Our one hope is to begin the whole labour of the mind again. Men converse by means of language, but words are formed at the will of the generality, and there arises from a bad and inapt formation of words a wonderful obstruction to the mind. Nor can the definitions and explanations with which learned men are wont to guard and protect themselves in some instances afford a complete remedy—words still manifestly force the understanding, throw everything into confusion, and lead mankind into vain and innumerable controversies and fallacies. . . ."—Francis Bacon.

(The above should be compared with our extract of last week, from C. B. Farrar, written 350 years later.)

CLINICAL COMMUNICATION

CATTLE MANGE

G. C. BRANDER,

Cooper Technical Bureau

Since publication of our communication on the treatment of cattle mange in your issue of October 29th (*Vet. Rec.* **61.** 727), further information on cattle mange in Great Britain has become available. It would appear that the condition is much more widely spread in this country than is generally realised as cases have been reported to us from several different areas.

The condition is very frequently mistaken for lice, ringworm, or a general eczematous condition. This mistake probably results from the fact that it is frequently difficult to recover sarcoptic mites unless deep scrapings are made. Another factor which tends to lead to mistaken diagnosis is that the majority of the lesions disappear during the summer, but it is found that careful examination in some cases reveals the presence of lesions around the neck and the base of the tail.

The clinical picture of sarcoptic mange in cattle is usually very typical as the mites show their greatest activity on certain parts of the body. The lesions are found around the root of the tail, with extensions along the back and down between the hind legs, and along the neck, extending to the ears and down to the dewlap. The affected areas show loss of hair and the epidermis becomes covered with scabs. In advanced chronic cases the skin becomes very thickened and hairless and develops a typical "elephant-skin"-like appearance.

An article in the *Journal of the American Veterinary Medical Association*, April, 1950, indicates that cattle mange is quite a serious problem in New York State—so much so, that the New York State Veterinary Authorities held a special conference on the problem in 1946.

It has been found that the condition may vary in its intensity from farm to farm—a mild form may be found in one herd, and in another, every animal on the farm may be badly affected. Where the condition occurs in a milk herd, there is a loss in milk supply, but this is often appreciated only when effective treatment has been applied and is followed by a marked improvement in milk production.

The vital importance of correct diagnosis in all cases of pruritus cannot be over-emphasised as on the correctness of the diagnosis depends the success of treatment. This point has been recognised in America by the appointment of research workers to investigate the various causes of chronic pruritus in cattle.

Cattle mange is essentially a disease of the winter months and it occurs, both in America and in this country, when the cattle are housed during the winter and in close contact.

Many farmers in this country are aware that chronic pruritus is a common condition in their herds, but the symptoms are usually attributed to lice. If treatment is applied at all it is usually in the form of one or other of the proprietary brands of louse powder. Where the powder applied contains benzene hexachloride some amelioration of symptoms follows, but the powder is not a suitable form in which to apply the insecticide to cure cases of mange. In our experience, thorough spraying of the animals with a suspension of benzene hexachloride containing 0·25 per cent. B.H.C. (equivalent to 0·03 γ B.H.C.) will clear up the disease satisfactorily after two sprayings at ten-day intervals. Where the lesions are advanced, with much loss of hair, three treatments may be necessary. B.H.C. has also been

used in America in the control of cattle mange, and the work is reported by Schwardt.[1] Benzene hexachloride was used at a strength of 0·3 per cent. B.H.C., but was only applied once, a second dressing being applied only if the lesions reappeared. On several farms one treatment appeared to be successful, but in others a second treatment was given at a month's interval.

From this work Schwardt concluded that when cattle are treated with B.H.C. for the control of cattle mange, at least two treatments with B.H.C. wettable powder are necessary. From our experience, consecutive treatments to be of value must be at intervals of not more than ten to 14 days.

Where cattle mange does occur, therefore, it is essent al that rigorous treatment of all animals is carried out, as if one animal fails to be treated it is probable that the condition will reappear in the herd from year to year. The exact life cycle of the sarcoptic mite of cattle has not been worked out completely, but the evidence at present available does suggest that it can exist in some latent stage on cattle throughout the summer months, to become active again when the animals are housed in the winter. This would suggest that November and December are the most suitable months for treatment, *i.e.*, before lesions are advanced.

Reference

[1]Schwardt, H. H. (1949.) *J. Econ. Ent.* **42.** 444.

ABSTRACTS

[The Histological Picture of the Inoculation Site and Regional Lymph-nodes in Experimental Subcutaneous Infection and Reinfection with Tubercle Bacilli (B.K.) in the Cow. Hubacher, K. (1949.) *Schweiz. Z. Path. & Bact.* **12.** 400–431.]

The object of the following examinations was to ascertain how far the reaction of the organism after tuberculous reinfection differs from the characteristic histological picture.

I.—Histology of the site of the first infection with *M. tuberculosis*, P-strain. (The so-called P-strain is a less virulent form of bovine tubercle bacillus.) Sections were taken from nodules at the site of inoculation and from the regional lymph-nodes of 18 calves inoculated with P-strain and slaughtered at intervals. Material was also taken from the primary nodules of a few adult animals which had been inoculated as older calves. Results: The seven to nine-day lesions show an uncharacteristic picture reminiscent of foreign-body granulation tissue, though the nature of the giant-cells betrays their tuberculous origin. The presence of leucocyte infiltrations and necrosis indicate that the lesions are essentially exudative in nature. The regional lymph-nodes do not yet show established tuberculous tissue but present a picture characteristic of commencing lymph-gland tuberculosis.

Twenty-eight to 38-day lesion: At the site of inoculation, typical tuberculous tissue is sparingly present but, in the lymph-nodes, it is already well established. The chief feature is a widespread necrosis which is already bordered by connective tissue. Numerous polymorphonuclear leucocytes are still in evidence.

Lesion of over 58 days: The site of infection and the lymph-nodes show a similar picture to the above but with a strong tendency to fibrous induration and scar formation and, where there are caseated lesions, to calcification.

II.—Histology of reinfection site. The majority of cases show sharply encapsulated, partly confluent tubercles, often with central calcification; some still show caseation. In a few cases, necrosis is predominant. The surrounding granulation tissue has a more unspecific character with a strong tendency to transformation into fibrous- and scar-tissue. In most cases, the integrity of the regional lymph-nodes is conspicuous. The tuberculous changes are considerable. Spread to associated lymph-nodes is never seen. Larger foci tend to become encapsulated. The whole process is comparable to Koch's phenomenon.

III.—Histological picture of site of reinfection with virulent bovine strains 1019 and Mi, in cows previously inoculated with P-strain and in non-inoculated controls. In cows which have received a few injections, there is a complete or incomplete post-primary complex which has a tendency to caseation and calcification; in those in which more inoculations have been made, the lesions progress to abscess formation and necrosis. There is no spread of infection beyond the regional lymph-nodes, whereas in the controls there is generalised tuberculosis. The greater the number of preliminary inoculations with P-strain, the less characteristic is the reaction picture. The tuberculin test gives negative results.

Lowenstein's theory, that a succession of recovered lesions tends to reinforce the immunity, is thus confirmed.

M. L.

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[On the Behaviour of Tubercle Bacilli in Experimental Reinfection of Cattle. Graub, von E. (1949.) *Schweiz. Z. Path. & Bact.* **12.** 459–467.]

Experiments were carried out to discover whether the immunity following infection which occurs in man, also occurs in cattle.

New-born calves were inoculated subcutaneously with a less virulent type of bovine tubercle bacillus, the so-called P-strain. Subsequent reinoculations were made with P-strain bacilli and later with more virulent strains, each time in the drainage area of a new lymph-node.

After the first inoculation, as also after reinfection, there is thickening of the subcutaneous tissue at the site of injection. Abscess formation is never seen at the first site but sometimes at the second. On being incised, the abscess heals rapidly. As in man, a primary complex is formed after the first infection, that is, tubercle bacilli can also be found in the neighbouring lymph-nodes. The less virulent P-bacilli are held up here, whereas more virulent strains cause generalised tuberculosis in control animals. Incomplete primary complexes may appear.

Experimental animals generally show complete resorption of the lesions produced at the site of reinfection, but tubercle bacilli can usually be demonstrated at the site of the first infection.

Inoculated animals kept in cohabitation with cows suffering from open lung tuberculosis showed no lesions in their organs. Anaphylactic reactions do not occur as a result of P-bacilli which may remain for years in the primary lesion and in the lymph-nodes. There is no endogenous reinfection in later years.

One experimental animal, Cow 85, was inoculated, after two previous inoculations with P-strain bacilli, with a highly virulent strain, which was cultivated from tuberculous milk and which caused generalised tuberculosis in a control. In Cow 85, no lesions were present other than abscess formation at the site of infection with the virulent bacilli. The rapid healing and the localisation of the disease process make this comparable with Koch's phenomenon in guinea-pigs. In 1948, virulent tubercle bacilli were still to be found at the infection site in the neck of the cow, but these lived in symbiosis with the host.

These experiments show that an infection immunity to tuberculosis also exists in cattle. M. L.

REVIEW

[Radiology in Small-Animal Practice. By G. B. Schnelle, v.m.d. 2nd edition. Published by North American Veterinarian Inc., Evanston, Illinois. 350 pp. and 305 illustrations. (Price unstated.)]

The first edition of this work appeared in December, 1943, under the title of " Radiology in Canine Practice," and it has been deemed necessary to change the title owing to later inclusion of much material concerning the domestic cat.

The first issue was exhausted in four years, and to-day we are pleased to welcome a second edition of what must undoubtedly be regarded as a valuable addition to the library of every small-animal practitioner who takes an intelligent interest in modern methods of diagnosis.

In the foreword by Merrill Sosman, M.D., the statement again appears that " this monograph by Dr. Schnelle is the first text-book in the English language on the subject of veterinary radiology." This assertion has been challenged previously, and we feel obliged again to correct it as a similar book by a British author appeared in 1939 and has now nearly exhausted its third edition.

The fact that both of these books are finding ready sales further exemplifies the need which exists for radiographic knowledge among the thousands of small-animal practitioners. Indeed, the large-animal practitioners are not lagging behind, for we find, in Great Britain at least, that ever-increasing use is being made of X-rays in the elucidation of diagnostic difficulties, especially among racehorses, hunters and pedigree cattle.

In the second edition of Schnelle's text-book more than 50 new illustrations have been added, and a few of the originals deleted. The author acknowledges that " a few poor reproductions from the first edition have been retained with the knowledge that they are not clear, but because they contribute something to the usefulness of the work." We are not in wholehearted agreement, and whilst we realise the ideal cannot always be attained, yet we feel that, in a *specialist* monograph, every illustration should have been a model of first-class quality and clarity. For instance, Fig. 26 is not at all distinct and would convey little to the average veterinary practitioner: the alterations described in the legend are barely visible in the radiograph except to an experienced radiologist; Fig. 27 is subject to very similar remarks; Fig. 30 shows absolutely nothing, and Figs. 18, 19 and 31 are little better; Fig. 90 is upside down.

In constructive criticism (should there be, as we hope, a third edition), we do feel strongly that each chapter which treats of a specific part of the skeleton should commence with illustrations of the normal, viewed from various angles, and with which the alleged abnormal may be compared, especially as in a number of the latter the lesions to which the author refers cannot be detected.

In Fig. 25 it would have been useful to the uninitiated reader if the diseased joint had been indicated by an arrow, as both femoral heads in this figure appear to be abnormal. There is no reference to, or illustration of, the normal carpus, or of the luxations or fractures of the small carpal bones—so common in the racing greyhound; nor is any reference made to the pisiform bone or fracture thereof, surgical treatment of which is practised in Great Britain. In fact, reference to the general index for such words as carpus or wrist, pisiform bone, hock or tarsus, scaphoid bone, reveals their absence. Yet it is an undoubted fact that the sporting and racing breeds of dogs are those which make the greatest demands upon X-ray diagnosis, because of the vulnerability of their hocks, wrists and toes to injury in the field. Fracture and/or dislocation of the scaphoid bone is probably the most common injury in the greyhound, and one which gives rise to a great diversity of opinion as to its treatment and prognosis. We searched with a great expectant interest for some reference to this (essentially radiographic) lesion, but without result. Another racing casualty—fractured os calcis—also escapes attention; and with regard to this bone, or any other bone of the skeleton, there is a complete absence of reference to the two modern methods of repair, *e.g.*, by metal plating, or intramedullary pinning, though brief reference is occasionally made to the Schroeder splint. It is appreciated that this is not a treatise on surgical technique, yet in the index on pp. 363, 364 there are two columns pertaining to treatment. Thus, we consider that space should have been afforded as guidance to the best modern means available for uniting the various types of fracture, all stages of which require X-ray verification.

These criticisms must not be allowed to detract seriously from the value of Schnelle's work, for we feel sure that in subsequent editions omissions and faults will be rectified. It must, inevitably, be of value to an author to know the reactions of his readers, and we shall be gratified if we have helped in any way.

It is interesting to note that the author confirms the view held by many British veterinarians, and denied by others, that calcification of the intervertebral discs is a very real condition in dogs, setting up paraplegia. It is a pity, however, that Figs. 93 and 94 so fail to depict it, though Figs. 95, 96 and 97 show it well.

The extended reference to osteomyelitis is gratifying as this disease has received far too scanty attention in the past, and is not so uncommon as is generally supposed.

The publishers are to be congratulated upon the excellence of their work, in providing a legible type on good quality art paper in a stout board cover, the whole making a handsome volume.

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Also received: " Neuzeitliche Embryotomie bei Pferd und Rind " (R. Gotze). Fourth edition. (1950.) With 93 illustrations. Published by M. & H. Schoper, Hanover. No price stated.

" Zur Kenutis der Kontakt-Insektizide." II. (R. Riemschneider). (1950.) Published by Dr. Werner Saenger, Berlin, C.2. No price stated.

RACEHORSE DOPING TESTS

The Johannesburg correspondent of *The Times* states that unusual steps have been taken by the South African Jockey Club to prevent the doping of racehorses. On all Transvaal courses under the club's jurisdiction, beginning on June 12th, two of the winning horses each day were subjected to chemical tests to establish whether or not they had been doped or whether any drug recognised by the club as a stimulant or sedative had been administered. Winners were selected by the stewards and specimens collected by veterinary surgeons were tested by the South African Institute for Medical Research. It is intended to apply the system later to all parts of the Union where racing is conducted under the rules of the club. The intended date for tests in Natal is August 1st and for the Western Cape a month later.

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BOOKLET ON HUSBANDRY AND DISEASES OF GOATS

Members will find a loose slip inserted in this issue of *The Veterinary Record* showing a few corrections to the recently published booklet on goats. It is suggested that this slip might be pasted inside the front cover of the booklet.

QUESTIONS IN PARLIAMENT

Dogs (Rabies)

Lieut.-Colonel Corbett (June 15th) asked the Minister of Agriculture how many dogs in quarantine have contracted rabies in the last 20 years; and what is the largest number of cases that have occurred in any one year.

Mr. T. Williams: Seventeen. The largest number of outbreaks that have occurred in a single year is three.

Lieut.-Colonel Corbett asked the Minister of Agriculture what is the average length of time taken for dogs to develop rabies after entering this country; and what is the longest time after importation.

Mr. T. Williams: During the past 25 years, the dogs which have developed rabies in Great Britain have died from that disease on the average about two and a half months after landing in this country. The longest period between landing and death has been seven and three-quarter months.

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Dangerous Dogs

Mr. Eric Fletcher (June 15th) asked the Secretary of State for the Home Department whether he will introduce legislation amending the Dogs Act to secure the destruction of dangerous dogs after a magistrate has made an order for such dogs to be destroyed.

Mr. Ede: Under an Act applying to the Metropolis there is already power for a magistrate to direct that a dog which has bitten or attempted to bite any person within the Metropolis should be destroyed and for the police to carry out the order of the court. I cannot hold out any prospect of its being possible to introduce in the near future legislation to enable the general law to be amended for the purpose suggested by my hon. Friend.

Mr. Fletcher: Is my right hon. Friend aware that in my constituency there is a particularly vicious dog which a magistrate has ordered to be destroyed, and that as a result of failure to comply with that order the owner has twice suffered a sentence of imprisonment? The police allege that they have no power to carry out the order, and unless something is done, when the owner comes out of prison in a few weeks' time the dog will again be restored to him.

Mr. Ede: I understand that in the case about which my hon. Friend has written to me the position is that when the time for appeal against the present order has expired the dog will be destroyed.

Sir J. Lucas: While agreeing with the Question, may I have an assurance that the right of appeal will be safeguarded, because some magistrates do not like or understand dogs?

Mr. Ede: This particular piece of legislation is confined to the Metropolis and it would have to be executed by the Metropolitan Police. In the case that has been brought to my notice I understand that they are waiting for the time for an appeal to end before action is taken.

Lieut.-Commander Braithwaite: Do police dogs enjoy a special dispensation in this matter? Is it still the case that other dogs are allowed two bites before being defined as dangerous?

Mr. Ede: No. I understand that in the Metropolis a dog is not even allowed a first bite before being regarded as dangerous. Police dogs are trained not to bite but merely to hold.

Mr. Keeling: Will the Home Secretary confirm the fact that dogs have often appealed successfully against an order for their destruction?

Mr. Ede: No. But I think that the owners of the dogs sometimes succeed.

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Duck Diseases

Mr. Crouch (June 15th) asked the Minister of Agriculture what research is taking place with regard to diseases of ducks; and whether any new methods of control have been discovered.

Mr. T. Williams: In addition to the other research work being done on poultry diseases special attention is being given to infections with the Salmonella group of micro-organisms, some of which are of special importance in ducks. Methods of diagnosis and control are under active study and I am pleased to say that progress is being made.

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Animal Slaughter (Scotland) (Humane Killer)

Colonel Gomme-Duncan (June 14th) asked the Secretary of State for Scotland to what extent the captive bolt humane killer is now alone used for the killing of animals for food in Scotland; and what steps he has taken to forbid the use of the electric stunning method.

The Secretary of State for Scotland (Mr. McNeil): The captive bolt humane killer is extensively used throughout Scotland, but at some of the larger slaughterhouses and bacon factories pigs are stunned by electricity. I have no power to forbid its use.

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Anthrax

Lieut.-Colonel Corbett (June 15th) asked the Minister of Agriculture how many cases of anthrax occurred in England in 1947, 1948, 1949 and up to date in 1950; in what counties they occurred; and what is considered to be the cause.

Mr. T. Williams: In England there were 108 outbreaks of anthrax in 1947, 95 in 1948 and 204 in 1949 and there have been 149 so far this year. Although outbreaks have occurred in the majority of counties they have been most numerous this year in Lancashire and the West Riding of Yorkshire. I am sending the hon. Member a statement showing numbers of outbreaks in each county in England during the four years in question. It is probable that the increased incidence of anthrax is due largely to the increased imports of fertilisers and animal feeding-stuffs from abroad.

NOTES AND NEWS

Diary of Events

June 29th.—Meeting of Western Counties Division, N.V.M.A., Royal Clarence Hotel, Exeter, 2 p.m.

June 30th.—Meeting of the North Wales Division, N.V.M.A., at the Morville Hotel, East Parade, Rhyl, 2 p.m.

June 30th.—Summer Meeting of the Lancashire Division, N.V.M.A. (See Notice).

June 30th.—Summer Meeting of the Lancashire Division, N.V.M.A. (See Notice).

July 12th and 13th.—Annual General Meeting of the Association of Veterinary Teachers and Research Workers (Northern Region), at Aberystwyth (Veterinary Department, Agricultural Building, Alexandra Road).

July 21st.—Meeting of the Association of Veterinary Teachers and Research Workers (Southern Region), at the Royal Veterinary College, Camden Town, N.W.1, 2 p.m.

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N.V.M.A. Council and Committee Meetings

The next Council and Committee meetings of the Association will be held in London on July 12th, 13th and 14th.

The time-table is as follows:—

Wednesday, July 12th, at 36, Gordon Square, W.C.1.
11 a.m. Organising Committee.
2.15 p.m. Veterinary State Medicine Committee.

Thursday, July 13th, at 36, Gordon Square, W.C.1.
10 a.m. Parliamentary and Public Relations Committee.
11.30 a.m. Home Appointments Committee.
2.30 p.m. General Purposes and Finance Committee.

Friday, July 14th, at Connaught Rooms, Great Queen St., W.C.2.
11 a.m. **Council Meeting.**

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N.V.M.A. CONGRESS, 1950

Bowls Competition

There will be a pleasure trip to Barry Island on Thursday afternoon, September 7th, for members and their ladies attending the Congress who wish to participate. In connection with this the Barry Athletic Club has extended an invitation to anyone interested to take part in a Bowls Competition that afternoon. Will those wishing to take advantage of this invitation please notify Mr. R. W. Hall, M.R.C.V.S., Tynewydd Road, Barry (Chairman of the Provisional Committee), and also intimate to him their usual positions of play on the green.

The Livesey Medal

First Awards to Professor Wright and Mr. Gordon Knight

By his will, Mr. Geoffrey H. Livesey (1874-1943) bequeathed to the Council of the Royal College of Veterinary Surgeons the sum of five hundred pounds upon trust "to invest the same and apply the income arising therefrom to provide a Livesey Medal to be awarded by the said Council every three years or after such longer interval as the said Council may determine to the person who in their judgment has done the most serviceable work towards the prevention and/or alleviation of pain and/or fear in animals. The Medal shall be of twenty-five pounds value at least and any surplus money after the payment of expenses in relation to the provision of the said Medal shall be paid to the recipient of the said Medal in order to assist him to continue his work in the prevention and alleviation of pain and fear in animals."

At the Quarterly Meeting of the Council of the Royal College of Veterinary Surgeons held in Dublin on Friday, June 9th, 1950, the Council made the first awards of the Livesey Medal under the trust set out above.

A Medal was awarded to each of the following:—Professor J. G. Wright, M.V.Sc., F.R.C.V.S., of the Veterinary School of the University of Liverpool, for his work in anaesthesia. Mr. Gordon C. Knight, F.R.C.V.S., of the Beaumont Animal Hospital of the Royal Veterinary College of London, for his work in surgery of small animals.

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New Award of the Royal College of Veterinary Surgeons

The late Major Francis Hogg, R.A.V.C., retd., who graduated as a veterinary surgeon on May 19th, 1909, from the Royal (Dick) Veterinary College, and who died on November 24th, 1949, left, by his will, a legacy of £500 to the Royal College of Veterinary Surgeons.

The Trust was to invest the same and to apply the income arising therefrom towards a prize to be awarded by the Royal College of Veterinary Surgeons as the Council of such Royal College may determine, to the person who in its opinion has done the most serviceable work towards the advancement of small-animal practice.

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Voting in R.C.V.S. Council Election

It is interesting to note that 1,534 voting papers were received in the recent Council Election, of which number 167 were returned by overseas members. There were in addition 32 voting papers declared invalid.

These figures contrast with the following:—

1949	... ...	1,466	27 spoiled
1948	... ...	1,102	11 spoiled
1947	... ...	904	8 spoiled
1946	... ...	1,203	13 spoiled

The number of voting papers returned by overseas members—167—was the greatest ever received.

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R.C.V.S. Diploma in Veterinary State Medicine

On the results of the examination held by the Royal College of Veterinary Surgeons in Edinburgh from June 8th-13th, 1950, the following candidates have been awarded the Diploma in Veterinary State Medicine:—

John Heckford Seamer.

Mark Henry Wharton.

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R.C.V.S. OBITUARY

Moody, William John, Capt., late R.A.V.C., 26, Price's Lane, Woodhatch, Reigate, Surrey. Graduated London, July 13th, 1904; Fellowship, December 11th, 1909. Died June 12th, 1950.

Mr. W. J. Moody, F.R.C.V.S.

Although it is some years since he last practised, Mr. William John Moody, whose death we record above, with much regret, was well known in the veterinary profession. He qualified from the Royal Veterinary College and was a Cranston Gold Medallist. After practising in Oxford he held a professorial appointment at the Royal (Dick) Veterinary College, Edinburgh, before going to the Club Hipico, Santiago, Chile.

Mr. Moody served in the Royal Army Veterinary Corps from 1915 to 1919 during which he gained a commission as a Captain, after which he was in charge of a district of the Northern Territories of the Gold Coast. During the 1939-45 war he was attached to M.I.5 and received special commendation for his work. He had been in poor health latterly and he did not recover from an emergency operation for a duodenal ulcer.

Mr. Moody is survived by his widow and two sons, to whom deep sympathy is extended in their loss.

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PERSONAL

Marriage.—Hunnam—Thorne.—At Southover Parish Church, Lewes, on Friday, June 9th, 1950, Robert Hunnam, B.V.Sc., M.R.C.V.S., elder son of Mr. and Mrs. Hunnam, of Warrington, Lancs, to Sallie Elisabeth, elder daughter of Mr. E. P. Thorne, M.R.C.V.S., and Mrs. Thorne, of Lewes, Sussex.

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ROYAL ARMY VETERINARY CORPS

Officers' Club Annual Dinner

The Annual Dinner of the Royal Army Veterinary Corps Officers' Club was held at Grosvenor House on Friday, June 9th. Brigadier J. J. Plunkett, C.B.E., Director, Army Veterinary and Remount Services, presided and 69 Officers were present.

The following were present:—

Brigadier J. J. Plunkett, C.B.E.; Major-General J. J. B. Tapley, C.B., D.S.O.; Brigadiers G. A. Kelly, C.B., H. S. Mosley, D.S.O., C. A. Murray, C.B.E., E. S. W. Peatt, O.B.E., J. J. Kane, O.B.E.; Colonels R. M. Bamford, O.B.E., G. Barnett, O.B.E., M.C., H. E. Gibbs, D.S.O., C. W. Heane, C. Holland, M.C., J. Judge, J. S. Keane, O.B.E., J. J. Mills, W. L. Sinton, M.B.E., G. F. Steevenson, O.B.E., A. G. Todd, C.B.E., D.S.O., C. H. S. Townsend, C.B.E., M.C., E. G. Turner, D.S.O.; Lieut.-Colonels W. E. Barry; V. A. Bartrum, O.B.E., G. L. Beaumont, J. Bell, J. C. Bennison, E. Brown, D.S.O., J. Clabby, M.B.E., R. C. Crowhurst, O.B.E., B. C. M. Edmonds, C. P. Fisher, O. S. Fisher, O.B.E., D. A. Green, J. F. Hart, O.B.E., A. G. Heveningham, O.B.E., V. G. Hinds, J. A. Langley, L. H. B. Poer, M.C., J. McL. Ross, M.B.E., W. M. Rouse, D. F. G. Smith, D. I. C. Tennant, J. V. Tevlin, G. F. Watkins; Majors A. M. Bain, E. Brayley-Reynolds, O.B.E., F. L. Cundell, D. C. E. Danby, C. Davenport, O.B.E., J. J. Dunlop, M.C., C. G. Farmer, A. V. Franklin, T.D., T. Lishman, R. I. Macrae, H. P. J. Murray, G. T. Newport, M.B.E., E. F. H. Noel, J. R. Steevenson, D.S.O., D. M. Stewart, E. Wallace, W. J. B. Watson, J. E. Wood, M.B.E., G. D. Young; Captains C. S. Bassett, R. S. T. Bowden, W. A. Gibbs, P. J. Mitchell, J. H. Wilkins; Lieutenants J. Cowic-Whitney, J. Stratton.

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R.A.V.C. GOLFING SOCIETY

The annual meeting of the R.A.V.C. Golfing Society was held at the North Hants Golf Club, Fleet, on Thursday, June 8th, 1950.

The following members attended: Maj.-General J. J. B. Tapley, C.B., D.S.O., Brigadier J. J. Kane, O.B.E., Brigadier E. S. W. Peatt, O.B.E., Colonel R. M. Bamford, O.B.E., Colonel A. G. Todd, C.B.E., D.S.O., Colonel J. Judge, Lieut.-Colonel J. Bell, Lieut.-Colonel R. H. Knowles, Lieut.-Colonel D. F. G. Smith, Major Denys Danby, Captain R. S. T. Bowden, Captain G. S. Walker, Captain J. H. Wilkins.

The meeting was held in brilliant sunny weather without a breath of wind. The 1950 Captain of the Society (Lieut.-Colonel J. Bell) played well to win the Founder's Cup and Prize (Handicap): he was bettered only by that superb golfer Colonel Jock Judge, who had made the long journey from Edinburgh to attend the meeting. Colonel Judge took back the R.A.V.C. Challenge Cup and Prize to Scotland!

Brigadier Peatt won the Conder Cup.

The Captain's Prize (1st) in the Bogey Handicap played in the afternoon was won by Colonel Bell with minus 2 and the Club Prize (2nd) was shared by Smith, Wilkins and Walker with minus 3.

The office-bearers for 1951 were elected as follows:—

President: Colonel A. G. Todd, C.B.E., D.S.O.

Vice-President: Lieut.-Colonel J. Bell.

Captain: Brigadier E. S. W. Peatt, O.B.E.

Committee: Colonel R. M. Bamford, O.B.E., Lieut.-Colonel R. H. Knowles, Captain G. S. Walker.

Hon. Secretary and Treasurer: Captain J. H. Wilkins.

The 1951 meeting will be held at the North Hants Golf Club, Fleet, at the end of May or beginning of June, and it is hoped that many more ex-R.A.V.C. Officers (Regular, Temporary or Territorial) will attend.

ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

SWINE FEVER:

Surrey.—Lilac Farm, Weston Green, Effingham, Surrey (June 14th); Ashleigh, Bakeham Lane, Virginia Water, Surrey (June 16th); King George V Sanatorium Pig Club, Hydestile, Godalming, Surrey (June 17th).

Berks.—Costessy, Barkham Road, Wokingham, Berks (June 19th).

* * * * *

LEGAL NOTES

TOWN AND COUNTRY PLANNING ACTS

During the winter, 1948-49, a veterinary surgeon practising in Harrow built a 30 ft. square compound at the end of his garden with a concrete floor and a 7 ft. corrugated iron perimeter fence, and erected therein portable kennels for the purpose of hospitalising dogs.

In August, 1949, the local authority called on the veterinary surgeon to apply for permission for the change of use of the premises stated to have occurred by the above alterations. The veterinary surgeon contested this demand, maintaining that hospitalisation was an essential and inseparable part of veterinary practice and did not, therefore, constitute a change of use. The local authority, Harrow, did not accept this statement by the veterinary surgeon, who thereupon appealed to the Ministry. His appeal was allowed by the Ministry.

In view of the importance of this decision the Registrar, R.C.V.S., will be pleased to put any other veterinary surgeon concerned or their solicitors in touch with the legal advisers who dealt with the above case.

* * * * *

Failure to Report Tuberculous Cow.—In its issue of June 13th, the *Farmer and Stock-Breeder* reports that fines totalling £100 (the maximum of £50 in each case) with £3 9s. costs were imposed by Taunton (Somerset) magistrates on Frederick John Pike, 38, cattle dealer, of Hillmoor, Culmstock (Devonshire) for failing to report possession of a tuberculous cow, and failing to isolate it.

Mr. F. W. Willmott, prosecuting, said the Ministry of Agriculture was spending something like £2,000,000 a year in efforts to eradicate bovine tuberculosis, and to provide a pure milk supply. Compensation was paid when owners reported suspected cases.

Evidence was given that Pike took the cow with four others to Taunton Market. A policeman saw the animal fall down on leaving a lorry and, when killed, it was found to be suffering from advanced tuberculosis, including an old standing disease of the udder.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

PANTING IN CATTLE

Sir,—In the abstract of Dr. Minett's paper which appeared in your issue of April 15th, and in the letter from Brigadier Stewart published on May 6th, there is an apparent failure to discriminate clearly between three separate conditions, each of importance to the veterinarian and stockowner in tropical countries.

The first condition is the distress, accompanied by panting, drooling of saliva, and a rise in body temperature, that is exhibited by cattle of European breeds when they are exposed to unduly high ambient temperatures or the direct rays of the tropical sun. These symptoms may be observed in any of the European breeds, at sustained shade temperatures over 70° C., but certain breeds show more resistance than others, notably the Channel Island breeds.

The symptoms are due, as Brigadier Stewart rightly points out, to failure of the heat-regulatory mechanism to cope with the high external temperature, and the phenomenon has been investigated experimentally by Regan & Richardson (1938) under controlled laboratory conditions. By comparison with Zebu cattle the European breeds have a higher basal metabolism, a smaller surface area in relation to bodyweight, poorer transpiration through the skin, and in many cases lack skin pigmentation. This type of panting may be seen even in England on an unusually hot summer afternoon, and rectal temperatures will rise to 103° C. or thereabouts. In a country like East Africa its incidence is by no means confined to areas that are climatically unfavourable for European cattle, and the condition may be seen in European cattle at 8,000 feet to 9,000 feet above sea level on any exceptionally hot afternoon. Reactions of this type occur as readily in the newly-imported animal as in the animal that has been bred for several generations in the tropics. The remedy is the provision of shade and spraying with water to lower the body temperature. Data concerning the effect of high atmospheric temperature upon the respiration rate and body temperature, taken by Mr. Hudson at Kabete, Kenya Colony at 6,200 ft., and by Dr. Anderson at Aisha and Muhoroni, were included in a general review of the subject with particular reference to Kenya conditions (Daubney, R., *East African Agric. Journal* (1942), pp. 127-141) published in 1942.

The panting of cattle under such conditions is essentially similar to the panting of dogs, and its function is cooling by evaporation of water at the lung-air interface. It seems likely that control of panting is voluntary, exercised by the animal in response to a sensation of comfort or discomfort.

The second condition under reference is the degeneration shown by European cattle or grade-European cattle after several generations in the tropics. It is commonly referred to by stock breeders as "loss of constitution," and consists of a lowering of the average bodyweight, poor bone development, with poorly sprung ribs and narrow pelvis, legginess, a thickened and unhealthy skin, a harsh and somewhat heavy, unhealthy-looking coat, and strikingly lowered production, whether of meat or milk.

This type of degeneration affects both beef and dairy cattle, but some Northern breeds, such as the Angus, the Shorthorn, the Hereford, the Ayrshire and the Friesian, deteriorate more rapidly than others, such as the Sussex and the Channel Island cattle. Animals of this type are unthrifty; they are unable to offer satisfactory resistance to any unfavourable influence, whether it be the incidence of tropical diseases, poor nutrition, or unsuitable climatic environment. It has never appeared to me that the individual animal is more distressed on a hot day than the newly-imported vigorous animal from Europe; in fact, I should have said they were if anything a shade less affected, but they are certainly much more distressed than the pure-bred Zebu, or low-grade with one quarter to one half of Zebu blood.

It is mainly upon the investigation of this degeneration that the work of Rhoad and his colleagues has been centred, but there is a good deal of literature on the subject from various parts of the world, dealing with such aspects as the development of the Santa Gertrudis breed (Kelley, 1932), the history of the Hope Farm, Jamaica (Cousins, 1933), and including the work of Bonsma (1940), and Du Toit & Bisschop (1939) in South Africa. In field surveys it may not be possible to distinguish at sight between degeneration due to climatic conditions, and that caused by a poor plane of nutrition with associated phosphorus deficiency, or by infection with certain enzootic diseases. It is generally accepted in Australia, South Africa and Kenya that degeneration of European breeds of cattle caused by climate does not occur where the annual mean temperature is less than 65° F, and if reference is made to meteorological maps it will be seen that the European breeds of cattle are mainly concentrated in such areas in South Africa (Bonsma, 1940) and East Africa (Daubney, 1942).

The remedy for this type of degeneration, as Brigadier Stewart has rightly pointed out, is the introduction of suitable Zebu blood by means of a back-cross. The King Ranch was the first concern to make extensive use of such a cross for beef purposes and to establish a breed of mixed *Bos indicus* and *Bos taurus* blood; and the ranchers of South Rhodesia introduced Afrikander bulls to their grade Hereford, Angus, Shorthorn and Sussex herds in the middle thirties to cope with a poor plane of nutrition, and an unfavourable climate. Similarly Zebu crossing has been undertaken with beef cattle in Queensland and the Northern Territory of Australia.

The first attempt to use Zebu bulls on dairy cows of European breeds was probably made on the Hope Farm, Jamaica, and pedigree Sahiwal bulls of high-producing strains from the Pusa herd were imported into Kenya in 1938 for back-crossing on high-grade European dairy cows in marginal areas where some degeneration was evident. The Kenya experiment thoroughly justified itself. The heifers from the back-cross, grew more rapidly, reached service age from 4 to 6 months earlier than grade Guernsey and Ayrshire heifers $\frac{7}{8}$ and $\frac{15}{16}$ European blood; they were heavier milkers and their milking weights were from 100 to 156 lb. more than the grades. Their skins and coats were finer; and their bone development, particularly the spring of the ribs and the width between the pin-bones, was as good as one could obtain under the best European conditions.

For the dairy industry no breed with a suitable mixture of Zebu and taurus blood has yet been established—there is no equivalent of the Santa Gertrudis—and the formation of such a breed is a task worthy of the attention of any government with interests in tropical countries. For the time being the individual dairyman, who has restored constitution by a single back-cross with Zebu blood has no alternative but to mate the back-cross heifer with a bull of European breed, and to continue top-crosses until he feels that degeneration is once again imminent or even apparent.

The third "panting" condition is invariably a sequel of severe reaction to the virus of foot-and-mouth disease, and in its incidence is confined almost exclusively to dairy cows of the European breeds. In a country such as Kenya, although foot-and-mouth disease is epizootic in the native areas, it is nevertheless possible by the exercise of precautions to keep dairy herds in the Highlands free from it for periods extending at times to 7 or 8 years. When after such a lapse of time a high-yielding dairy herd becomes infected the effects of the disease may be extremely serious, and the gravest economic loss is sustained through the appearance of panting cows with long soft woolly coats. At times as many as 60 per cent. of the cows of a high-producing herd may develop the panting, woolly-coated condition as a sequel to foot-and-mouth disease, and although perhaps two-thirds of the affected animals may recover to some extent in the course of two or three months, the remainder are left permanently incapacitated. These permanent "panters" grow long, soft, woolly coats, they suffer from dyspnoea when at rest and the panting is greatly increased on the slightest exertion; there is also severe bradycardia with a prominent jugular-pulse. Naturally their distress is accentuated by high ambient temperatures. They are debilitated for the most part, permanently sterile, and cannot be fattened for slaughter.

The first satisfactory explanation of the etiology of this condition was given by Nai (1936), who studied cases in Italy. Nai described lesions in the pituitary, adrenals, and other endocrine glands, and Mr. Hudson and I had no difficulty in confirming the existence of a pituitary lesion in typical cases in Kenya. To the best of my recollection Nai's was the first published description of the condition as being associated with foot-and-mouth disease. That the condition should be practically confined to cows of the European dairy breeds is not astonishing when one considers the greater susceptibility of the European breeds to the disease, and the delicately balanced endocrine system of the high-producing dairy cow. We have seen only one case in a native cow in Kenya, in one of the Department's improved native dairy-herds, and, as usual, the condition was observed to develop as a sequel to foot-and-mouth disease.

It is important that the veterinarian, the stockowner, and the administrator who shapes land utilisation policy in tropical countries, should be aware of the existence of these conditions, and that he should not be confused regarding their causation, since a mistaken view as to their nature and origin may easily lead, on the one hand, to abandonment of areas that are suitable for European cattle, or on the other to persistence in attempts to farm European cattle in marginal or unsuitable areas.

If I have indulged in a measure of over-simplification in trying to condense a description of these three conditions into a letter of reasonable length, those of your readers who are familiar with the conditions and with the extensive literature on the subject will no doubt forgive me.

Yours faithfully,
R. Daubney.

Serum and Vaccine Institute,
Abbassiah,
Cairo
May 30th 1950.

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DEHORNING OF CATTLE

Sir,—The above paper by Messrs. Tazewell and Greenough, MS.R.C.V.S., in *The Veterinary Record* of June 3rd, 1950, appears to me to be excellent and to give a reasonable guide to technique for those uncertain how to set about dehorning. I would, however, venture to disagree and/or comment upon a few points and also to invite further views on the subject.

(*a*) The R.S.P.C.A. has, I understand, recently brought a successful case against use of the rubber band method, by a farmer.

(*b*) Local Anaesthesia.

i. I find midway between horn and upper lid, or even nearer to the lid, almost infallible when "on form," using

ii. a ½-inch needle, 5 c.c. of anaesthetic.

iii. I find that when anaesthesia has not been successful, in the majority of cases either I have been too far forward or there was a subcutaneous swelling. When anaesthesia has been complete there has been no evidence of this swelling.

iv. Dispersed infiltration seems to be a waste of time unless first injection is unsuccessful.

(*c*) Instruments.

Long coarse hacksaw blades are least tiring, cheap to throw away, and seldom break if anaesthesia is good and the head well held. Embryotomy wire is more expensive, helpers do not get the "knack" quickly, and healing takes longer. A sack over the animal's eyes stops much fidgeting. A tourniquet is effective if care is used.

(*d*) Post-operative.

The worst sinus infection seen by me was in a herd where employees of the owner used the wire saw, under my direction, and most cases occurred where the wire jammed or broke. Response to treatment varied—tubes of penicillin intramammary cleared most—or otherwise Protegan. Sulphanilamide cleared a serious case that responded to no other treatment.

Using the hacksaw, only a few cases of sinusitis have been reported, which quickly yielded to penicillin intramammary suspension.

(*e*) So long as no stump remains to grow I cannot see that it matters if the head appears square.

Finally, despite my criticisms, the paper seems to me to be masterly, as I learned long ago that no two areas give rise to the same conclusions or treatments of any one subject. I repeat that I would like to know other views on the subject, particularly in regard to the instruments used.

Yours faithfully,
W. V. Gray.

"Jarlette,"
Storrington, Sussex.
June 7th, 1950.

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R.C.V.S. COUNCIL ELECTION

Sir,—Permit me, through the courtesy of your columns, to thank all those who supported me in the recent election to Council, R.C.V.S. I assure them that I shall endeavour to serve the profession to the best of my ability and ever to uphold the dignity of our calling.

Yours faithfully,
J. W. Emslie.

University of Glasgow Veterinary School,
Department of Animal Pathology,
83, Buccleuch Street,
Glasgow, C.3.
June 16th, 1950.

. . . . . .

Sir,—May I thank each of the 652 Fellows and Members of the Royal College who recorded a vote in my favour at the recent Council Election.

I am deeply conscious of my responsibility to these members, but by regular attendances and careful attention to the work of Council I hope by the end of my term of office to have warranted their confidence.

Yours faithfully,
Harry Holroyd.

Simmons Street, Blackburn.
June 10th, 1950.

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Sir,—I would be very grateful if, through the Correspondence columns of *The Veterinary Record*, you could enable me to thank all those members who voted for me in the last R.C.V.S. election. As most will have noticed, I was unsuccessful in the poll, but my enthusiasm remains unaltered and I hope for their support again if and when I am nominated once more in the future.

Yours faithfully,
Philip J. Mitchell.

91, London Road,
Chelmsford, Essex.
June 13th, 1950.

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"No Foot—No Horse"

Sir,—Was not the principle "No Foot—No Horse," which was recently described in the *Record* as attributable to Jeremiah Bridges (1751), laid down by Xenophon at a much earlier date?

When one remembers that the Ancient Greeks used unshod horses, and operated on the rough, stony and often mountainous terrain of Greece, Asia Minor, and the Middle East generally, it can be judged what a grand observer and practical horseman the Ancient Greek author was.

Yours faithfully,
J. C. Taylor.

Teemore,
Beccles,
Suffolk.
June 15th, 1950.